

ART. 18.—*The Stone-flies of New Zealand (Order Perlaria), with Descriptions of New Genera and Species.*

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THE stone-flies, or Perlaria, form a very distinct order of insects, characterized by a combination of a primitive orthopteroid form of imago with an aquatic hemimetabolous form of larva. The perfect insects may at once be recognized by the following principal characters: *Head* wider than long, with rather small compound eyes placed wide apart; antennae long and many-segmented; mouth-parts mandibulate; no constricted neck region. *Thorax* with very distinct prothorax, the pronotum large and more or less flattened; meso- and meta-thorax quite separate and well developed, so that the wings are fairly wide apart at their bases; legs with short coxae, usually placed wide apart, the femora rather flattened, the tarsi three-segmented. *Abdomen* with ten distinct segments and a pair of anal cerci, which may consist of from one to very many segments; no appendix dorsalis. *Wings* in the position of rest folded longitudinally down the body, either more or less flatly or wrapped around it; the hindwing with a broad anal fan, which is folded under the rest of the wing when at rest. Ordinal characters in the wing-venation are the condition of M (which always has only two branches), the presence of a series of intercubital cross-veins in the forewing, and the position of  $Cu_2$  just anterior to the cubito-anal furrow; in the hindwing there is always some amount of fusion between Rs and M close to the base of the wing, and IA runs parallel and very close to  $Cu_2$ .

The perfect insects fly but little, and are usually to be found in close proximity to the streams in which their larvae live, either resting on rocks or hiding amongst the foliage fringing the water's edge, from which they can best be dislodged by sweeping.

The larvae are in general of a similar shape to the imagines, and are usually to be found in those parts of the stream where the water runs fastest, in cascades and rapids. Some are active, some very sluggish; but all alike possess great power of clinging to rocks against the rush of the water. In many cases external gills are developed on different parts of the body; the form and position of these gills afford valuable family characters within the order. The larvae are of economic value as trout-food.

Very little is known about the stone-flies of New Zealand, as the order has been greatly neglected both by collectors and by systematic entomologists. Only seven species have so far been described, though a season's careful collecting by Mr. W. G. Howes, of Dunedin, and myself has produced four times that number. The order is especially well represented in the colder parts of New Zealand, and a large number of the new species come from localities in Otago and Southland. These are being studied by Mr. Howes, and are not dealt with in this paper. The main object in

view in writing the present paper is to give reliable keys to the New Zealand families and genera, and only secondarily to describe some new species taken by myself in the North Island, and by Mr. Howes and myself in the Arthur's Pass district of the South Island. To save the space required for a full historical *résumé*, full references are given under each genus and species to all previously published descriptions and accounts of New Zealand stone-flies.

Before giving keys to the families and genera, or entering upon the descriptions of species, it will be necessary to explain the terminology used for the wing-venation. This is the Comstock-Needham system, the notation of which is given in full in the legend of fig. 1. Besides the veins, there are also the cross-veins and the separate areas of the wing to be considered, neither of which are notated in the figures. For cross-veins the rule is to name them from the main veins which they connect. In the Perlaria the most important sets of cross-veins are the following:—

(1.) The *medio-cubitals*, a series of long cross-veins connecting the main stem of M with  $Cu_1$  below it. The series begins with  $M_5$ , which was originally (as shown by many fossil forms) a true branch of M, and ends with the last long cross-vein before or at the forking of M. Whether this series is complete or incomplete is a character of generic and sometimes of family importance.

(2.) The *inter-cubitals*, a series joining  $Cu_1$  with  $Cu_2$  below it. This series is complete for at least the basal portion of  $Cu_2$  in the forewing throughout the order.

(3.) The *cubito-anals*, a series joining  $Cu_2$  with IA below it. This series is complete in the forewings of Eustheniidae only.

(4.) The *inter-anals*, connecting the anal veins with one another. Their number, form, and position are of great value in classification. On the anal fan they are present in Eustheniidae only.

(5.) The *distal cross-veins*, a general term to comprise all the irregularly placed cross-veins lying in the distal portion of the wing. These are absent in Nemouridae.

(6.) The *transverse cord*, or *anastomosis*, is formed, in the family Nemouridae only (figs. 17, 18), by alignment of the sole remaining inter-radial, radio-median, and medio-cubital cross-veins with short bent portions of the main veins, at about the middle of the wing, so as to form a continuous line crossing the wing obliquely from R to  $Cu_1$ .

Besides the above there are two important sets of veinlets—*i.e.*, short branches of main veins resembling cross-veins, but, unlike them, preceded in the larval wing by tracheae. These are—

(1.) The *costal series of veinlets*, a short set of anterior branches of vein Sc, running across the costal space. One of these, situated not far from the base, persists throughout the order in all forms in which the complete set has been lost. This is called the *humeral veinlet* (*hm*).

(2.) The *pterostigmatic veinlets*, lying in the region of the pterostigma—*i.e.*, the space between  $R_1$  and the costal margin, from the end of Sc to the end of  $R_1$ . The most persistent of these is formed, as Comstock has shown, by the forking of the end of Sc. The lower branch of the fork bends down and fuses with  $R_1$  for a short distance, finally leaving it again as a free veinlet running upwards to the costa. This veinlet is labelled  $Sc_2$ . When a second veinlet is present, more distally placed, it is formed by the forking of  $R_1$  near its end, and is labelled  $R_{1a}$ . Only rarely do we meet with more than these two pterostigmatic veinlets in the Perlaria.

For the separate areas of the wing, or *wing-spaces*, the rule is that they should be named from the vein bordering them anteriorly. Thus the costal space lies between C and Sc, the subcostal between Sc and R, and so on. When a space is bordered by a branch of a main vein anteriorly it takes the name and notation of that branch. To avoid confusion the notation for wing-spaces is written without capitals—*e.g.*, Sc means “subcostal vein”; *sc*, “subcostal space.” The pterostigma is a specially named area, defined in the preceding paragraph; in the forewing it is sometimes more heavily chitinized than the rest of the membrane.

The *anal area* is the whole area lying posterior to the cubito-anal furrow, and carries on it all the anal veins, which are convex. In the forewing it is often spoken of as the *clavus*. In the hindwing it is greatly enlarged, and is known as the *anal fan*. The contour of the outer margin of the hindwing is strongly broken by a re-entrant angle or bay separating the anal fan from the rest of the wing in all families of Perlaria except the Eustheniidae (fig. 1); in this latter family the outer margin forms a single continuous curve. The number of veins on the anal fan, their condition, whether branched or simple, and the presence or absence of cross-veins between them, are important family characters within the order.

KEY TO THE FAMILIES OF THE ORDER PERLARIA FOUND WITHIN NEW ZEALAND.

A. *Imagines.*

- |   |   |  |                 |
|---|---|--|-----------------|
| 1 | { | Large insects with numerous cross-veins on all parts of the wing, including the anal fan, whose margin forms an unbroken contour with that of the rest of the hindwing ..  | EUSTHENIIDAE.   |
|   |   | Medium to small (rarely large) insects in which the anal fan has no cross-veins (rarely one only), and its margin joins the margin of the rest of the hindwing in a re-entrant angle or bay .. .. .  | 2<br>3          |
| 2 | { | Transverse cord absent; distal cross-veins present .. .. .   | NEMOURIDAE.     |
|   |   | Transverse cord present; no distal cross-veins. .. .. .  |                 |
| 3 | { | Forewing with Sc <sub>1</sub> ending up beyond two-thirds of the wing-length from the base, leaving a short pterostigmatic region beyond it. Anal fan with seven or eight main veins, inclusive of 1A; first branch of 2A a forked vein .. .. .    | AUSTROPERLIDAE. |
|   |   | Forewing with Sc <sub>1</sub> ending up at between one-half and two-thirds of the wing-length from the base, thus leaving a long pterostigmatic region beyond it. Anal fan with only six main veins, including 1A, and none of them forked .. .. . | LEPTOPERLIDAE.  |

B. *Larvae.*

- |   |   |  |                 |
|---|---|--|-----------------|
| 1 | { | Larvae with visible gills .. .. .  | 2               |
|   |   | Larvae without visible gills .. .. .   | 3               |
| 2 | { | Gills a series of paired latero-ventral abdominal appendages on segments 1-5 or 1-6 .. .. .  | EUSTHENIIDAE.   |
|   |   | Gills a rosette of numerous small filaments arranged around the anus .. .. .   | LEPTOPERLIDAE.  |
| 3 | { | Larvae of small size and normal shape, with minute cerci consisting only of a single segment .. .. .                               | NEMOURIDAE.     |
|   |   | Larvae of moderate size and of long, cylindrical shape, with short cerci consisting of a moderate number of short segments .. .. . | AUSTROPERLIDAE. |

Family EUSTHENIIDAE.

Subfamily STENOPERLINAE.

Insects of large size, slender build, and of green, yellow, brown, or grey coloration. Forewing about five times as long as broad, the costa not dilated basally. Cerci short. Male with short superior appendages and short upturned copulatory hook.

This subfamily is found in southern Chile, New Zealand, eastern Australia from Queensland to Victoria, and South Australia, but not Tasmania.

Genus STENOPERLA. (Fig. 1.)

Moderately large insects, expanding from 50 mm. to 70 mm. Antennae from one-half to two-thirds as long as forewing. Pronotum somewhat heart-shaped, about as wide as long. Costal series of veinlets few and incomplete, there being always a long gap between the humeral veinlet and the next one. Medio-cubital cross-veins in forewing forming only a single row of cellules, only occasionally connected by a cross-bar.

*Genotype*.—*Stenoperla prasina* (Newman). New Zealand.

The only other described species of this genus is *S. australis* Till. from eastern Australia, but an undescribed species of a green colour has also been found in Queensland.

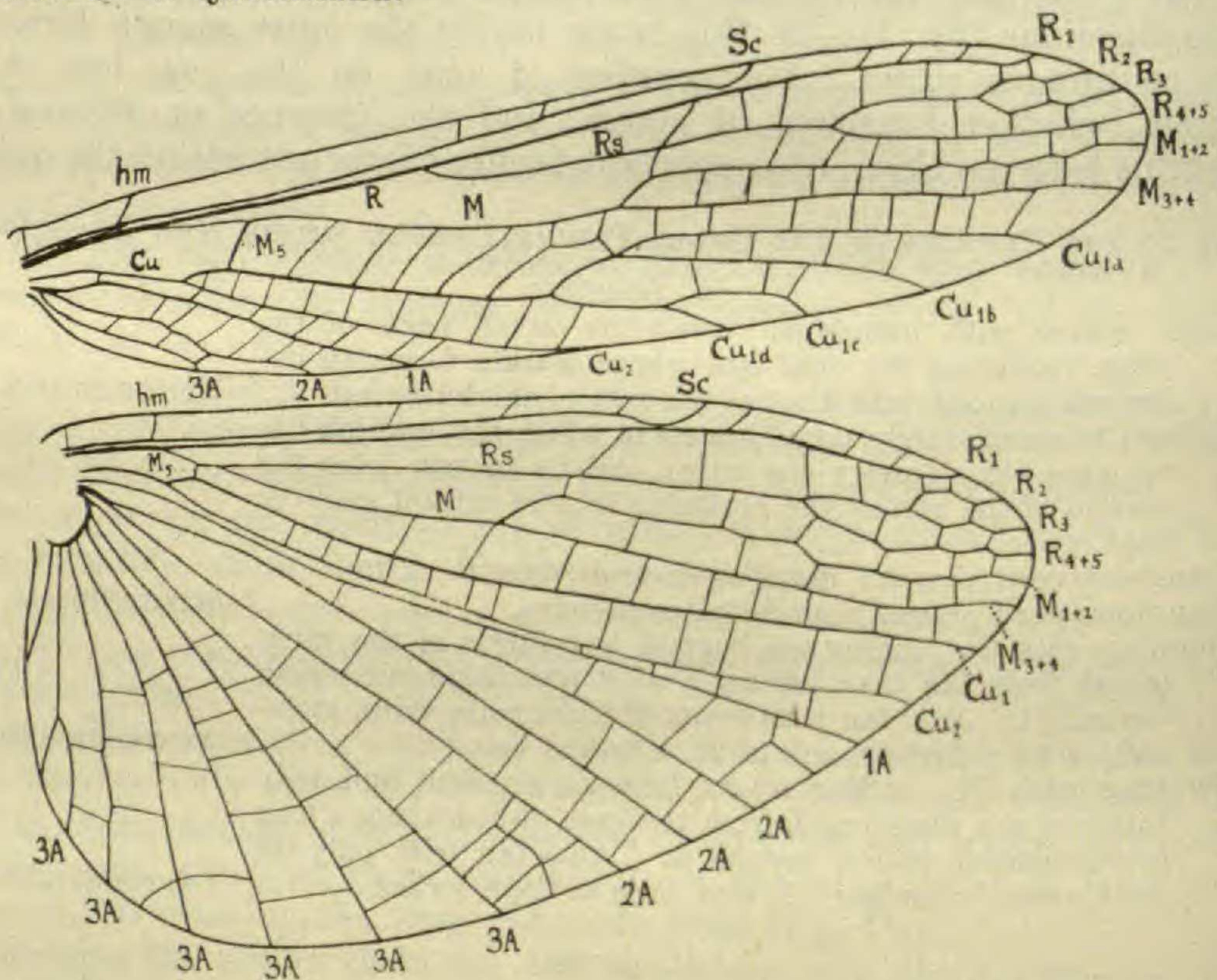


FIG. 1.—Wing-venation of *Stenoperla prasina* (Newm.). 1A, 2A, 3A, the three anal veins; Cu, cubitus; Cu<sub>1</sub>, first cubitus, with its branches Cu<sub>1a</sub> to Cu<sub>1d</sub>; Cu<sub>2</sub>, second cubitus; hm, humeral veinlet; M, media; M<sub>1+2</sub>, M<sub>3+4</sub>, its two main branches; M<sub>5</sub>, its archaic basal posterior branch, which has become the most basal of the medio-cubital series of cross-veins; R, radius; R<sub>1</sub>, its main stem; Rs, radial sector, with its branches R<sub>2</sub>, R<sub>3</sub>, and R<sub>4+5</sub>; Sc, subcosta.

*Stenoperla prasina* (Newman). (Fig. 1.)

*Chloroperla prasina* Newman, 1845, *Zoologist*, vol. 3, p. 852. *Hermes prasinus* Walker, 1852, *Cat. Neur. Brit. Mus.*, p. 206. *Stenoperla prasina* McLachlan, 1866, *Trans. Ent. Soc.*, ser. 3, vol. 5, p. 354; Hudson, 1892, *Manual Entom. N.Z.*, p. 106, pl. 16, fig. 3; Hutton, 1899, *Trans. N.Z. Inst.*, vol. 31, p. 212; Hudson, 1904, *N.Z. Neuroptera*, p. 5, pl. 1, figs. 4-5; Tillyard, 1921, *Proc. Linn. Soc. N.S.W.*, vol. 46, pt. 2, p. 233, pl. 15, fig. 9 and text-figs. 1, 4.

This species, easily recognized by its large size and by the bright-green coloration of the wings, is found in all parts of New Zealand where there is running water. Occasionally a yellow variety is found, in which the wings are somewhat shorter than in typical specimens.

*Type* in British Museum collection.

### Family AUSTROPERLIDAE.

Tillyard, *Canadian Entomologist*, Feb., 1921, p. 40.

This family is confined to New Zealand, Tasmania, and Victoria. There are only two genera, *Austroperla* Needham and *Tasmanoperla* Tillyard. Both genera have the second inter-anal cross-vein (fig. 2, *k*) strongly thickened.

### Genus AUSTROPERLA Needham. (Fig. 2.)

Needham, 1905, *Proc. Ent. Soc. Washington*, vol. 18, p. 109.

*Heteroperla* Hare, 1910, *Trans. N.Z. Inst.*, vol. 42, p. 30.

*Genotype*.—*Austroperla cyrene* (Newman).

This genus is distinguished from *Tasmanoperla* Till. by having, in the forewing, a definite anal angle, distad from which the posterior margin runs almost parallel with the costal margin of the wing, and also by the much weaker formation of the distal cross-veins.

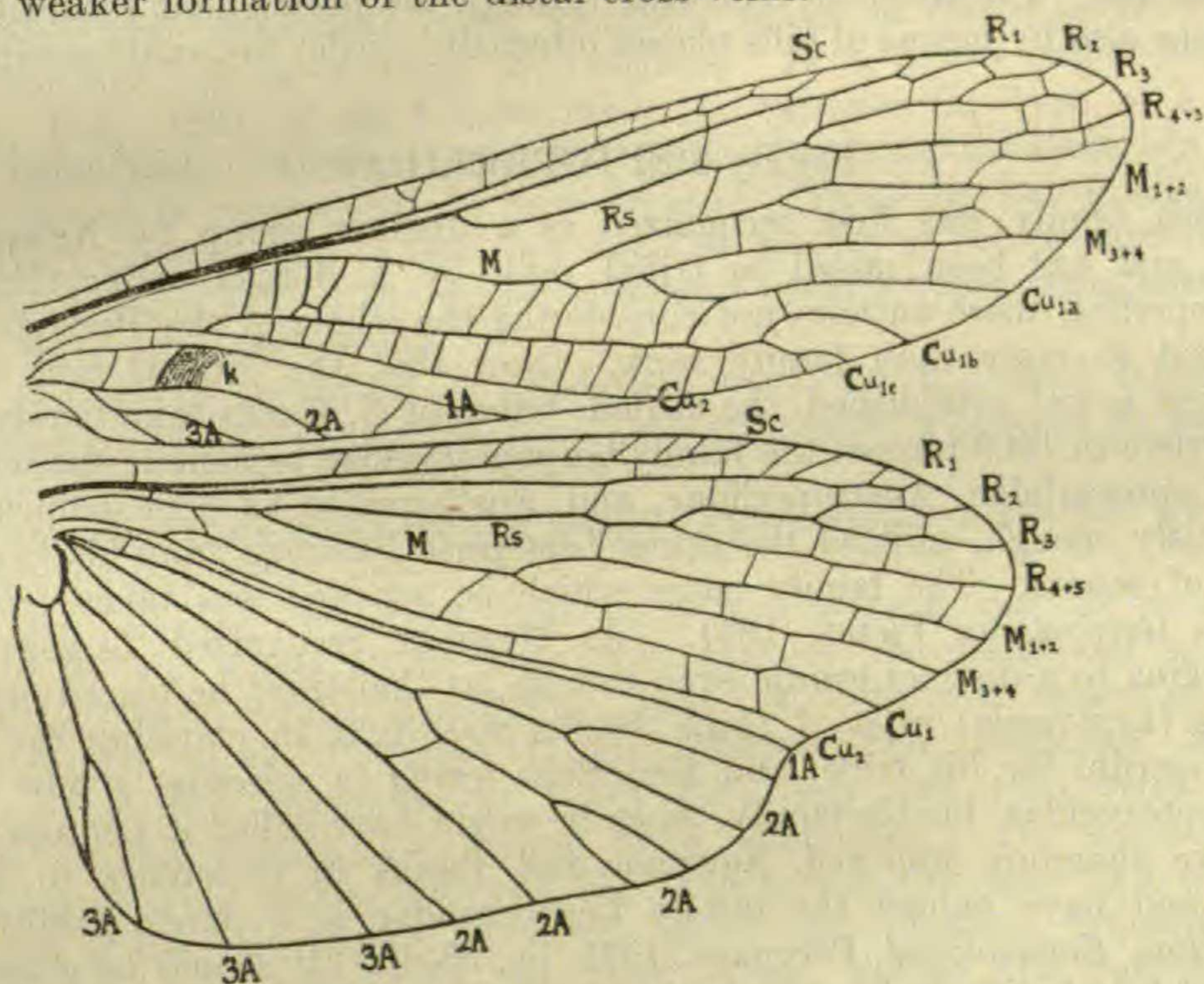


FIG. 2.—Wing-venation of *Austroperla cyrene* (Newm.). (For lettering see fig. 1, except *k*, the strongly thickened second inter-anal cross-vein.)

### *Austroperla cyrene* (Newman). (Fig. 2.)

*Chloroperla cyrene* Newman, 1845, *Zoologist*, vol. 3, p. 853. *Perla* (?) *cyrene* Walker, 1852, *Cat. Neur. Brit. Mus.*, p. 168; McLachlan, 1874, *Trans. N.Z. Inst.*, vol. 6, App., p. xcii (genus undet.). *Stenoperla* (?) *cyrene* Hutton, 1899, *Trans. N.Z. Inst.*, vol. 31, p. 212. *Heteroperla cyrene* Hare, 1910, *Trans. N.Z. Inst.*, vol. 42, p. 30.

*Type* in British Museum collection.

This common species varies greatly in size, specimens being found with an expanse from 20 mm. up to 30 mm. It may readily be distinguished by its folding the wings rather flatly down above its abdomen, with much less rolling of them around the body than in the Leptoperlidae, and also by its striking colour-pattern. The whole of the body is black, the wings blackish with weakly formed distal cross-venation, the forewing with a conspicuous cream-coloured humeral patch, which is continued more or less clearly as a pale stripe along part or whole of the costa. The legs are black, but the tibiae have a broad band of pale yellow occupying more than half their length. Cerci short.

It is of interest to note that a species of *Tasmanoperla* existing in Victoria, but not yet described, has a coloration closely similar to this species. There is also to be found in Otago a species of *Zelandoperla*, not yet described, which closely resembles it in coloration, but can be at once distinguished by its much longer cerci, as well as by its very different venational characters.

The larvae are very sluggish creatures, and frequently congregate at the edges of streams, under moist rocks or in wet trash, where other stone-fly larvae would not be able to exist. They are also unique in being able to stand removal from their natural habitat and living for quite a long time under abnormal conditions, even withstanding a considerable degree of desiccation. Probably they breathe through the integument generally, and perhaps also by means of gills placed internally within the anal opening.

#### Family LEPTOPERLIDAE.

This family was first recognized as a distinct group by Newman in 1839, and has been raised to tribal rank by N. Banks under the name Leptoperlini, these authors not considering the whole of the Perlaria to be entitled to more than family rank. Now that the ordinal rank of the Perlaria is well established, the various tribes of N. Banks take family rank. Enderlein in 1909 formed the family Gripopterygidae to include the whole of the Leptoperlidae, Austroperlidae, and Eustheniidae as here defined, but, curiously enough, omitted the genus *Leptoperla* Newman from his keys and lists of genera. The family name which he adopted was taken from the genus *Gripopteryx* Pictet, 1841. As Newman recognized *Leptoperla* as belonging to a distinct group, even though, at that time, he placed only one genus (*Leptoperla*) in it, I think Banks was right in choosing the name Leptoperlini for his tribe, and Enderlein wrong in selecting a new name, Gripopterygidae, for his family, when he might have called it Leptoperlidae. I have therefore followed Newman and Banks in preference to Enderlein, and have named the family Leptoperlidae in a paper published in *Canadian Entomologist*, February, 1921, pp. 35-40. It should be noted that Enderlein's family is a composite one, and that when, in another paper, he subdivided it, he placed a portion of the true Leptoperlidae within the subfamily Gripopteryginae, together with the whole of the Eustheniidae and Austroperlidae, while another portion was placed in the subfamily Antarctoperlinae. This curious classification was brought about by selecting as the primary characters for subdivision the forked or simple condition of Rs and Cu<sub>1</sub>. A careful study of the whole group reveals the fact that two genera so closely allied as to agree in almost every character may differ only in one having Rs forked and the other having it simple—e.g., the

closely allied New Zealand genera *Zelandobius* and *Nesoperla*, which would have been placed by Enderlein in two distinct subfamilies, thus completely ignoring their true relationship to one another.

The Leptoperlidae are the dominant family of stone-flies in the southern portion of South America, in New Zealand, Tasmania, and Australia. Their larvae are common objects in fast-running streams, being found clinging to rocks where the water runs fastest. They are mostly sluggish creatures, and do not attempt to run away fast, like the larvae of *Stenoperla* and mayflies. The imagines fly but little, but may be found resting, with their wings rolled closely around their bodies, either on rocks or foliage near streams.

In order to classify the New Zealand species I have undertaken a comprehensive study of the whole family. New Zealand and Australia are both rich in species, and the faunas of the two countries are so closely allied that they had to be treated as a single whole. The final result of this study, as far as it can be carried out on the available material, goes to show that a number of closely allied genera exist in the two countries, but that no single genus is found both in Australia and New Zealand. *Leptoperla* Newman is confined to Tasmania. *Leptoperla opposita* Walker, to which there are a number of references by New Zealand authors, all of whom, following McLachlan, express a doubt as to whether this is really a New Zealand insect, is not found in New Zealand, and proves not to be congeneric with *Leptoperla beroë* Newman, which is the type of *Leptoperla* Newman; it is confined to Australia. In a recent paper (*Canad. Entom.*, Feb., 1921, p. 43) I have made *L. opposita* the type of a new genus, *Dinotoperla*. Another Australian genus, *Paranotoperla* Enderlein, also proves not to be represented in New Zealand. Thus the way is clear for the correct classification of the New Zealand species in the present paper, while the working-out of the rather numerous generic types from Australia is kept for a later publication.

As the species described by Enderlein from the Auckland Islands is very closely allied to one of the New Zealand genera, I propose to include it in the key given below.

To the characters given for the family Leptoperlidae in the key we may now add the following:—

In the forewing the three anal veins are present, but 3A is fused with 2A for the whole of its basal half, and its free distal end appears only as a short veinlet descending from 2A. In my paper on the "Classification of the Perlaria" (*Canad. Entom.*, Feb., 1921, pp. 35-40) I interpreted this formation to mean that only two anal veins were present in this family, 1A having been eliminated. The tracheation of the larval wing shows, however, that this is not the case. 1A is present, and is the vein named 2A in the paper just quoted. Tracheae 2A and 3A are both present in the larval wing, though the corresponding veins are fused together in the imago for a considerable distance. A closely similar formation is to be seen in the forewing of Nemouridae, and has been clearly elucidated by Comstock (see *The Wings of Insects*, 1918, pl. 1).

In the hindwing there is always either a complete or a partial fusion of  $M_{3+4}$  with  $Cu_1$ . This condition would not be suspected from a study of the imago alone, but can be clearly seen by examining the tracheation of the larval hindwing. A similar condition has been shown to exist in certain genera of Perlidae by Comstock.

## KEY TO THE GENERA OF LEPTOPERLIDAE FOUND IN NEW ZEALAND AND THE AUCKLAND ISLANDS.

1	{	Radial sector in both wings forked; hindwing with the fusion between $M_{3+4}$ and $Cu_1$ incomplete .. .. .	2
		Radial sector in both wings simple; hindwing with the fusion between $M_{3+4}$ and $Cu_1$ complete .. .. .	3
2	{	Fork of Rs long and well developed .. .. .	<i>Megaleptoperla</i> n. g.
		Fork of Rs short, terminal .. .. .	<i>Zelandobius</i> Till.
3	{	Forewing distinctly longer than hind .. .. .	4
		Forewing shorter than the hind .. .. .	<i>Aucklandobius</i> End.
4	{	No pterostigmatic veinlets in either wing; forewing without cross-veins below the distal portion of $Cu_1$ .. .. .	<i>Nesoperla</i> n. g.
		A set of pterostigmatic veinlets present in both wings; forewing with cross-veins descending from the whole length of $Cu_1$ .. .. .	<i>Zelandoperla</i> n. g.

Of the genera given in the above key, *Aucklandobius* End. is confined to the Auckland Islands, and is represented by a single species, *A. complementarius* End. The other three genera are found only in New Zealand.

## GENUS MEGALEPTOPERLA n. g. (Fig. 3.)

To the characters given in the above key we may add the following: Insects of moderate to large size, from 1 in. to over 2 in. in expanse. Forewing narrow, three and a half times as long as wide; Sc lying close alongside  $R_1$  for its whole length and forking at its tip;  $Cu_1$  ending up about half-way between end of  $Cu_2$  and apex of wing; 1A very close to  $Cu_2$ ; only one inter-anal cross-vein connecting 1A with 2A. Both wings with a set of pterostigmatic veinlets present.

Genotype.—*Leptoperla grandis* Hudson.

*Megaleptoperla grandis* (Hudson). (Figs. 3, 4.)

*Leptoperla grandis* Hudson, *Trans. N.Z. Inst.*, vol. 45, p. 51, 1913.

Hudson's description deals only with the size and coloration of this species, and fails to mention any of the very striking features of the venation, which separate it at a glance from all other described Perlaria. To the details already given in the generic key and definition the following specific characters may now be added:—

*Head* 3 mm. wide across the eyes, which are nearly black, but only 1.7 mm. long inclusive of the projecting clypeal shelf, which is itself only about half as wide as the rest of the head. Ocelli small but prominent; antennae with large bases set well forward in front of the eyes, the two basal segments considerably enlarged, the rest cylindrical, slightly hairy. Mouth-parts yellowish-brown, the palpi rather short.

*Thorax*: Pronotum sub-trapezoidal, 2 mm. long by 2.5 mm. wide, slightly wider behind than in front; the hinder edge with a narrow raised rim, as shown in fig. 4; median longitudinal furrow present but weakly formed. Meso- and meta-notum with a pale-yellowish median longitudinal band. Legs: Fore tibiae marked alternately with two transverse bands of dark fuscous and two of pale testaceous; hind legs with numerous soft hairs.

*Abdomen*: In the male the last two segments are paler than the rest, rich brown. The appendages are strongly curved and turn upwards behind the tenth tergite; viewed laterally their ends are flattened and well rounded; viewed from behind they are close together at their bases, but diverge apically, their tips appearing sharply pointed; the small copulatory



hook projects upwards between them but is considerably shorter. Cerci 3 mm. long, with numerous small ring-like segments, yellowish-brown with abundant short hairs.

*Wings*: Specific characters in the wing-venation are the presence of a complete series of costal veinlets in the forewing, and the very regular and complete formation of the distal cross-veins in both wings, associated with a certain amount of zigzagging of the branches of Rs and  $M_{1+2}$ . The mottled grey and whitish colouring of the forewing is continued on the distal two-thirds of the costa of the hindwing, including the pterostigma; the rest of the hindwing is whitish-subhyaline.

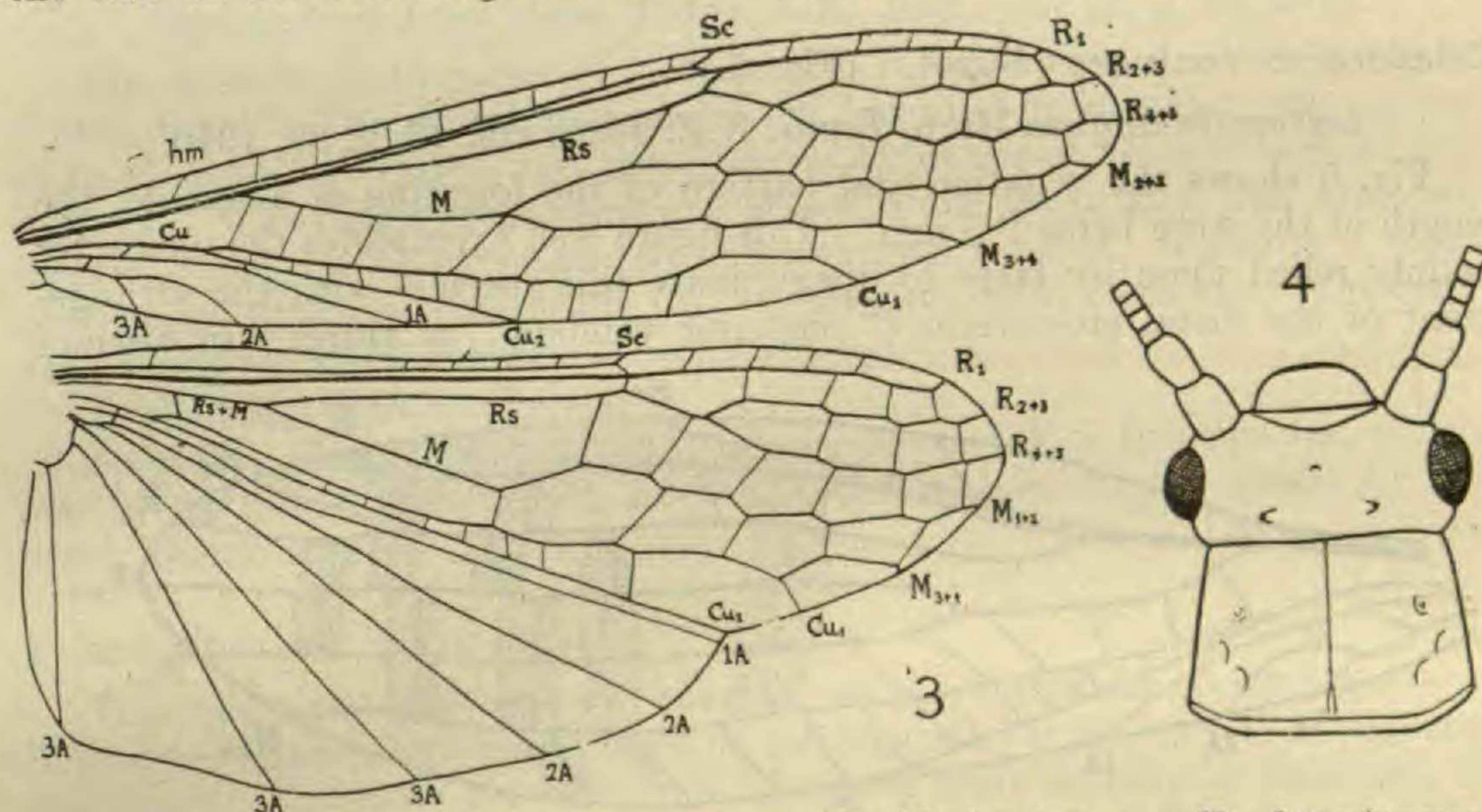


FIG. 3.—Wing-venation of *Megaleptoperla grandis* (Hudson) n. g. (For lettering see fig. 1.)

FIG. 4.—Head and pronotum of *Megaleptoperla grandis* (Hudson), ♂ ( $\times 4.4$ ).

*Type* in Mr. G. V. Hudson's collection; sex not specified.

*Locality*.—The type specimen was taken near Ohakune. Other localities for it are Tokaanu, Lake Taupo, where the larva is not uncommon under rocks in the Tongariro River (R. J. T.); Arthur's Pass and Dunedin (W. G. Howes).

#### Genus ZELANDOBIUS Tillyard. (Figs. 5, 8.)

Tillyard, *Canadian Entomologist*, Feb., 1921, p. 43.

To the characters given in the key we may add the following: Insects of small size, under 1 in. in expanse. Both wings with or without extra costal veinlets besides the humeral; pterostigma without veinlets; fork of Rs very short, terminal, usually without cross-veins, but sometimes with a single one as shown in fig. 6, forewing. Distal cross-veins irregularly placed, not very numerous; in forewing a complete series below  $Cu_1$  right to its end, and only a single inter-anal connecting 1A with 2A. Sc not terminally forked, but with its apex turned upwards to the costa, and a cross-vein descending on to  $R_1$  some little way before the apex.

*Genotype*.—*Leptoperla confusa* Hare.

Several species of this genus occur in New Zealand. Hare has described two species, both under *Leptoperla*—viz., *Z. confusus* (Hare), and *Z. hudsoni* (Hare).

KEY TO THE SPECIES OF THE GENUS ZELANDOBIUS.

- |   |   |   |                              |
|---|---|---|------------------------------|
| 1 | { | Forewings unicolorous, pale-brownish .. .. .  | <i>Z. unicolor</i> n. sp.    |
|   |   | Forewings fuscous, with darker markings .. .. .   | 2                            |
| 2 | { | Markings of forewing tending to become confluent in transverse bands and broadly enveloping the distal cross-veins ..                           | <i>Z. confusus</i> (Hare).   |
|   |   | Markings of forewing remaining as distinct fuscous shadings of the distal cross-veins, merely outlining but not broadly enveloping them .. .. . | 3                            |
| 3 | { | Cerci as long as abdomen; terminal fork of forewing arising before level of end of $R_1$ .. .. .  | <i>Z. hudsoni</i> (Hare).    |
|   |   | Cerci excessively short; terminal fork of forewing arising at or beyond level of end of $R_1$ .. .. .   | <i>Z. furcillatus</i> n. sp. |

*Zelandobius confusus* (Hare). (Fig. 5.)

*Leptoperla confusa* Hare, *Trans. N.Z. Inst.*, vol. 42, p. 29, 1910.

Fig. 5 shows the venation and pattern of the forewing of a female, the length of the wing being 9.5 mm. This figure well exemplifies the character mainly relied upon by Hare to discriminate this species—viz., the arrangement of the distal cross-veins (“posterior veinlets” of Hare) “in distinct

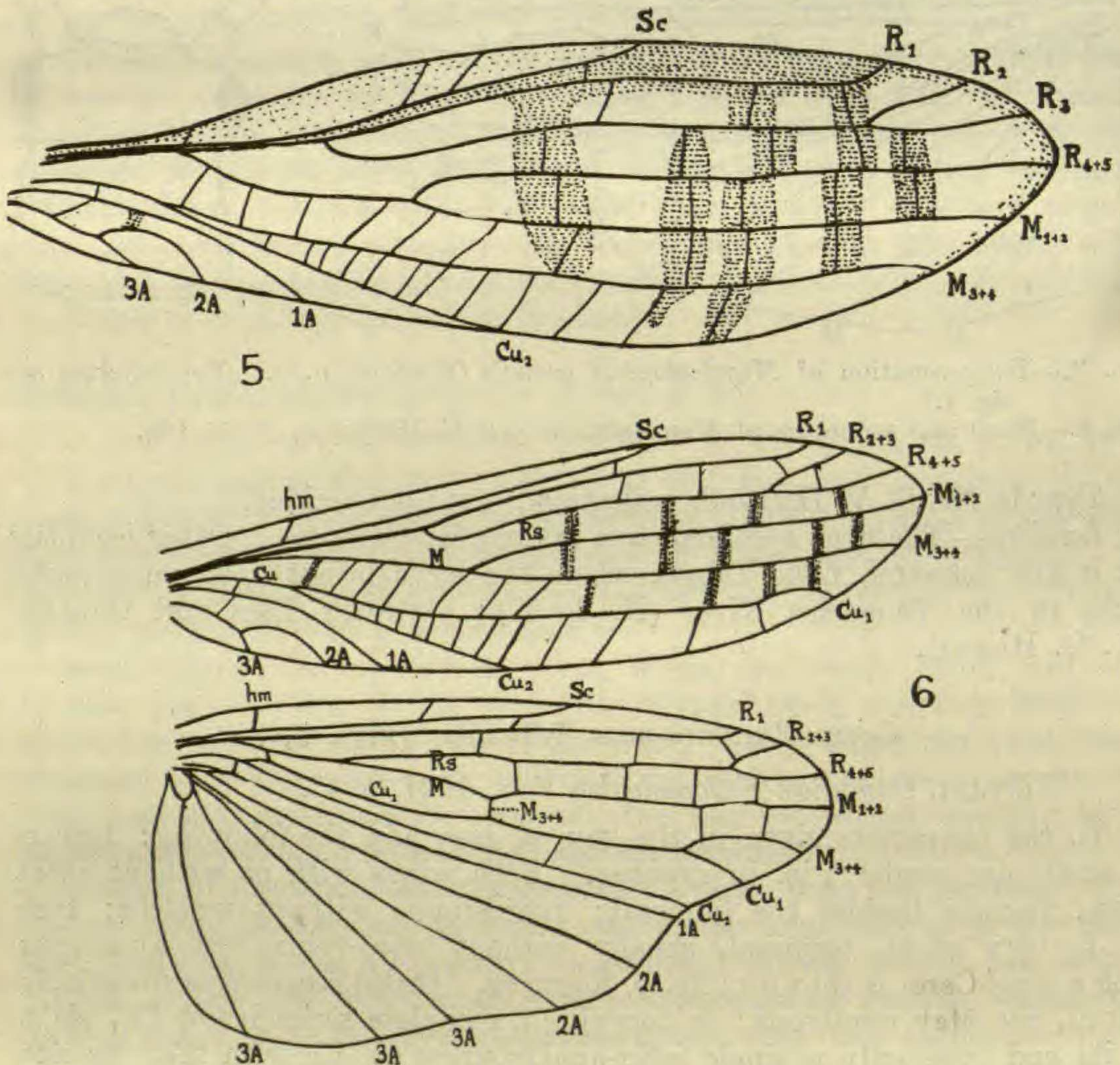


FIG. 5.—Wings of *Zelandobius hudsoni* (Hare). (For lettering see fig. 1.)

FIG. 6.—Forewings of *Zelandobius confusus* (Hare). (For lettering see fig. 1.)

series, the grey markings about the veinlets of each series being confluent, and not in the form of distinct spots.” It should be added, however, that the number and position of the cross-veins is not constant, so that there is some variability in the form of the pattern, though the confluence of

markings is always more or less marked. The specimen figured had three extra costal veinlets besides the humeral on the left forewing, but only two on the right. The pterostigmatic region is shaded and stands out quite conspicuously. The cerci, not mentioned by Hare, are short—only about 1.2 mm. long.

*Type* in Mr. Hare's collection.

*Locality*.—Karori, Wellington. I have also seen a series taken by Mr. H. Hamilton on Mount Hector, 16th February, 1921.

*Zelandobius hudsoni* (Hare). (Fig. 6.)

*Leptoperla hudsoni* Hare, *Trans. N.Z., Inst.*, vol. 42, p. 30, 1910.

Fig. 6 shows both wings of this species, the forewing of which is about 8 mm. long.\* The costal margin of the forewing is straight, not curved as in *Z. confusus* (Hare), and there are no extra costal veinlets beyond the humeral. The distal cross-veins are placed quite irregularly, and are very distinct, each one being separately outlined with fuscous. There is a complete series of cross-veins below  $Cu_1$  in forewing, right to its tip. The cerci are as long as the abdomen.

*Type* in Mr. Hare's collection.

*Locality*.—Karori, Wellington. I have never taken this species, which can be at once distinguished from all other species of the genus by its much longer cerci.

*Zelandobius furcillatus* n. sp. (Fig. 7.)

This common little species bears a strong superficial resemblance to *Z. hudsoni* (Hare), but can at once be distinguished from it by the following characters: Antennae blackish, moniliform, in male as long as forewing, in female shorter. Terminal fork of Rs in both wings exceedingly short, arising beyond the level of the end of  $R_1$ , or, much more rarely, directly under the end of  $R_1$ . Intercubital series of cross-veins not continued beneath the whole or greater part of the length of  $Cu_1$  in forewing, but ending up either at end of  $Cu_2$  or a little beyond it. Costal space of forewing with

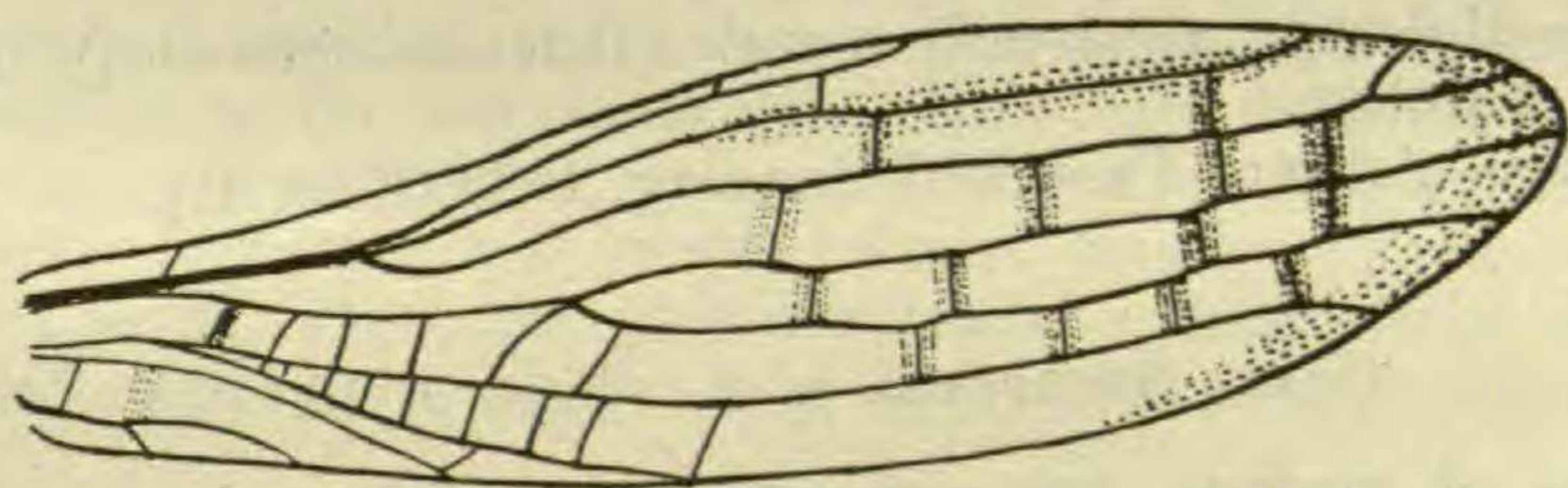


FIG. 7.—Forewing of *Zelandobius furcillatus* n. sp.

a small extra veinlet besides the humeral; this veinlet placed well distad along Sc. Cerci very short, about 0.3 mm. long, with only five or six segments. Male with short upturned appendages. Female with subgenital plate strongly bilobed. Forewing of male 7 mm., of female 8.5 mm. long.

*Types*.—Holotype male and allotype female in Cawthron Institute collection (Tarawera; male 16th November, female 15th November, 1919; R. J. T.).

\* In my paper in *Canadian Entomologist*, February, 1921, text-fig. 4c, p. 42, I inadvertently figured the forewing of this species under the name *confusus*.

*Locality*.—Common in many parts of New Zealand: Rotorua, Tarawera, Taupo; also Cass and Kingston (R. J. T.). Probably generally distributed.

*Zelandobius unicolor* n. sp. (Fig. 8.)

Resembles the preceding species in having the short extra distal veinlet in the costal space of the forewing, and in the excessive shortness of the terminal fork, which arises below the end of  $R_1$ , but differs from it in being a more robust insect, of somewhat larger size (forewing 9 mm.), with broader wings, of very different coloration, and with the antennae not so definitely moniliform, pale-brownish at base, darkening towards apex. Forewing subhyaline, tinged with pale-brownish, and along the costa with

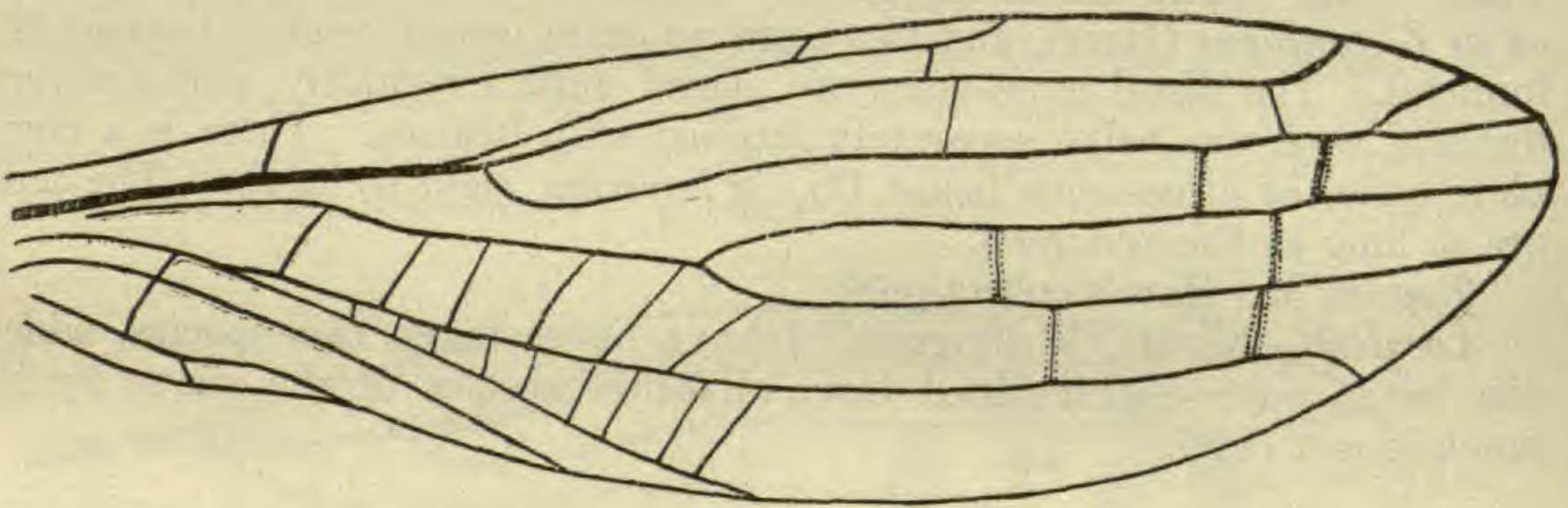


FIG. 8.—Forewing of *Zelandobius unicolor* n. sp.

a suspicion of rose-pink; the veins yellowish-brown. Hindwing hyaline with the faintest tinge of yellowish-brown. The intercubital series of cross-veins in the forewing does not go beyond the end of  $Cu_2$ , and there are very few distal cross-veins, only two (rarely three) between each pair of main veins, as shown in fig. 9; those between  $R_s$  and  $M_{1+2}$ ,  $M_{1+2}$  and  $M_{3+4}$ ,  $M_{3+4}$  and  $Cu_1$  respectively are very faintly shaded with pale fuscous. Cerci excessively short.

*Type*.—Holotype, apparently a male (abdomen shrivelled), in Cawthron Institute collection.

*Locality*.—Arthur's Pass, 18th January, 1920 (R. J. T.).

Genus NESOPERLA n. g. (Figs. 9, 10, 12.)

Insects of medium size, somewhat larger than those comprised in *Zelandobius* Till. Radial sector simple in both wings. Costal space with no extra veinlets beyond the humeral. Pterostigma without any veinlets. In the forewing the series of cross-veins below  $Cu_1$  is incomplete distally. Hindwing with the fusion between  $M_{3+4}$  and  $Cu_1$  complete.

*Genotype*.—*Leptoperla fulvescens* Hare.

This genus differs from *Zelandobius* Till. in having  $R_s$  simple in both wings, in having the fusion between  $M_{3+4}$  and  $Cu_1$  complete in the hindwing, and in not possessing any extra veinlets in the costal space. It differs from *Zelandoperla* n. g., to which it is very closely allied, by not having any pterostigmatic veinlets, and by the distal series of cross-veins in the forewing below  $Cu_1$  being absent from the distal part of the area in question.

## KEY TO THE SPECIES OF THE GENUS NESOPERLA.

- |   |  |                              |
|---|--|------------------------------|
| 1 | { Forewings unicolorous semitransparent brownish .. .. .<br>Forewings with a definite pattern of alternating light and dark areas .. .. .  | 2                            |
|   |  | 3                            |
| 2 | { Larger species (forewing 13 mm.) with large reddish-brown pronotum, the posterior lateral corners of which are rounded in the female. (Male unknown) .. .. .<br>Smaller species (forewing 11.5 mm.), of slenderer build, with smaller blackish pronotum, the posterior corners of which are produced into two prominent spines in the male and cut off at right angles in the female .. .. . | <i>N. howesi</i> n. sp.      |
|   |  | <i>N. spiniger</i> n. sp.    |
| 3 | { Forewings greyish ochreous, each distal cross-vein surrounded by a small pale subhyaline area .. .. .<br>Forewings brownish or fuscous, with three (more rarely only two) large subhyaline areas extending irregularly across the wing at wide intervals .. .. .   | <i>N. fulvescens</i> (Hare). |
|   |  | <i>N. trivacuata</i> n. sp.  |

*Nesoperla fulvescens* (Hare). (Fig. 9).

*Leptoperla fulvescens* Hare, *Trans. N.Z. Inst.*, vol. 42, p. 29, 1910.

The venation and pattern of the forewing of this very striking species are shown in fig. 9. Besides the very characteristic formation whereby the distal cross-veins are isolated within pale subhyaline areas, there is also a larger irregular area of the same kind reaching from the basal portion of  $R_s$  across the fork of  $M$  and across  $Cu_1$  to end on the apex of  $Cu_2$ ; this area varies somewhat in different specimens, but is roughly triangular, its base being on  $R_s$  and its apex on  $Cu_2$ . There is a complete set of distal cross-veins between  $M_{3+4}$  and  $Cu_1$ , but the intercubitals do not continue quite to the end of  $Cu_1$ .

*Type* in Mr. Hare's collection.

*Locality*.—Karori, Wellington. I have not taken this species.

*Nesoperla howesi* n. sp. (Figs. 10, 11 *a*, *c*.)

♀. Forewing, 13 mm.; hindwing, 11 mm.; expanse, 27.5 mm.

*Head* rich reddish-brown, except for the triangular space between the ocelli, which is blackish, and a narrow bar of blackish running from each lateral ocellus to the compound eye. Eyes very dark brown. Antennae 9 mm. long, yellowish-brown, pubescent, with a few longer delicate hairs.

*Thorax*: Pronotum rich brown, 1.7 mm. long by 2.2 mm. wide, shaped as shown in fig. 11, *a*, the posterior lateral corners being well rounded. Meso- and meta-notum black. Legs brown, the middle femora darkened beneath.

*Abdomen* black, touched with reddish-brown on sides; segment 10 rich brown. Ventral plate projecting in the form of a semi-oval lobe, rather narrow, covered with fine hairs (fig. 11, *c*). Cerci 3.5 mm. long, brown.

*Wings*: Forewing a unicolorous semitransparent brownish-testaceous, in life very bright and having a distinctly reddish tinge; the veins slightly darker. Hindwing paler, more inclined to greyish except along costa, which remains brownish. Venation of forewing as shown in fig. 10, with  $Sc$  forked at its apex (contrast the form of apex of  $Sc$  in forewing of *N. fulvescens*—fig. 9), few distal cross-veins irregularly placed, only two between  $M_{3+4}$  and  $Cu_1$  instead of a complete set as in *N. fulvescens*, and a long space distally below  $Cu_1$  without cross-veins.

*Type*.—Holotype female, unique, in Cawthron Institute collection.

*Locality*.—Arthur's Pass, female, 18th January, 1920 (R. J. T.).

In life this was a very striking species, its rich reddish-brown colour and unicolorous wings marking it out clearly from all the rest, including the closely allied following species.

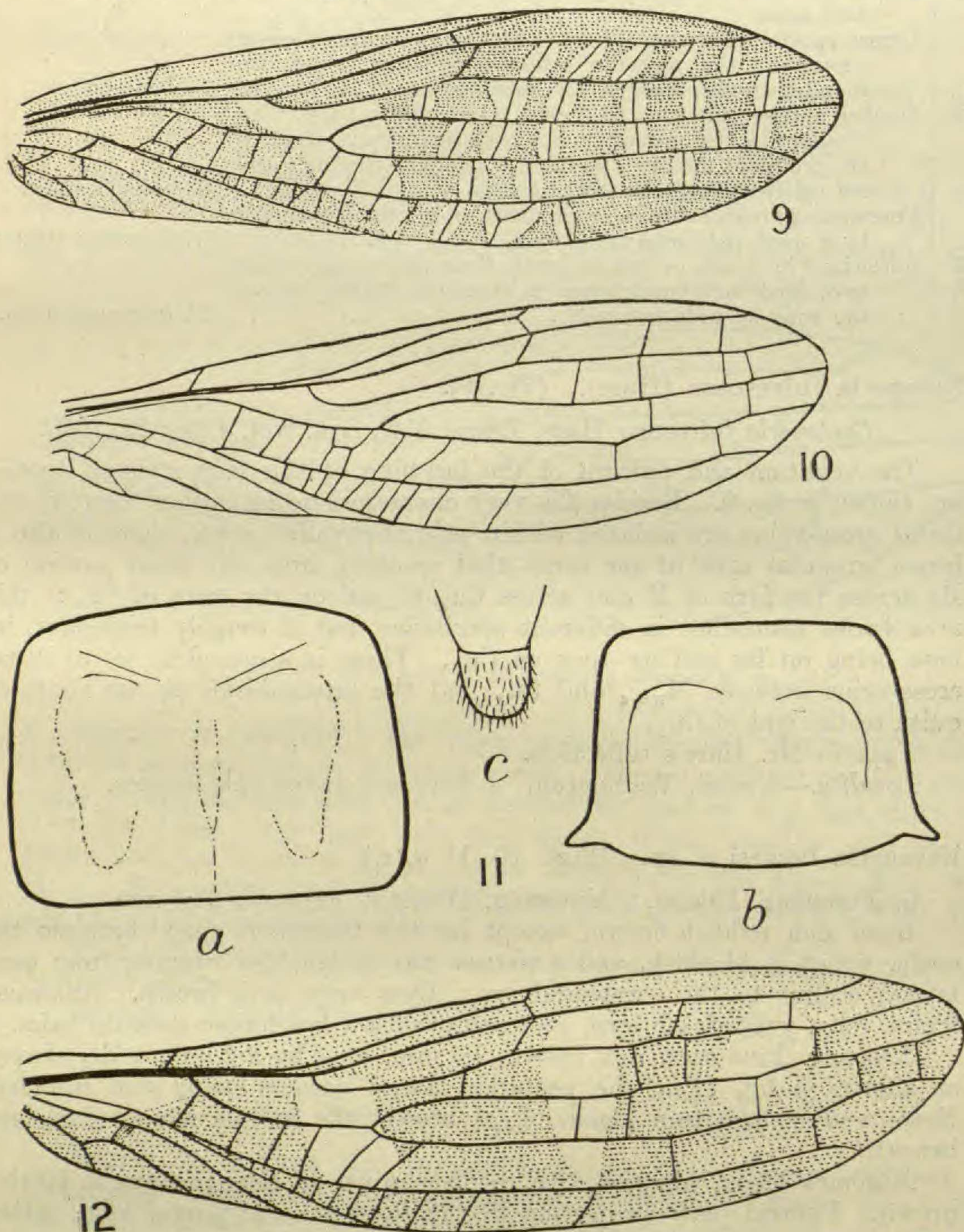


FIG. 9.—Forewing of *Nesoperla fulvescens* (Hare), n. g.

FIG. 10.—Forewing of *Nesoperla howesi* n. g. et sp., ♀

FIG. 11.—*a*, pronotum of *Nesoperla howesi* n. sp., ♀, outline ( $\times 12$ ); *b*, pronotum of *Nesoperla spiniger* n. sp., ♂, outline ( $\times 12$ ); *c*, ventral plate of *Nesoperla howesi* n. sp., ♀ ( $\times 20$ ).

FIG. 12.—Forewing of *Nesoperla trivacuata* n. g. et sp.

*Nesoperla spiniger* n. sp. (Fig. 11*b*.)

♂. Forewing, 11.5 mm.; hindwing, 9.5; expanse, 24 mm.

General appearance not unlike that of the preceding species, but a smaller and much slenderer insect, with duller unicolorous brown coloration.

Epicranium and pronotum blackish, the latter 1.4 mm. long by 2 mm. wide, and having the posterior lateral corners produced into two strong projecting spines (fig. 11, *b*). Appendages strongly upcurved, sharply pointed, with the shorter copulatory hook lying between them and having a narrowly blunt apex. Venation closely similar to that of *N. howesi* n. sp.

Female closely similar in size and general appearance to male, but having the posterior lateral corners of the pronotum cut off sharply at right angles, thus differing from those of *N. howesi* n. sp., which are rounded. Abdomen much slenderer than in *N. howesi*, reddish-brown in colour, darkest at base, and becoming bright-reddish apically. Ventral plate much less prominent than in *N. howesi* n. sp.

*Types*.—Holotype female, allotype male, and series of six paratype males in Cawthron Institute collection. (Holotype and allotype, 18th January, 1920, Arthur's Pass; R. J. T.)

*Locality*.—Arthur's Pass, January, 1920; taken both by Mr. Howes and myself.

*Nesoperla trivacuata* n. sp. (Fig. 12.)

♂. Forewing, 8.5 mm.; hindwing, 7 mm.; expanse, 18 mm.

In this species the head, thorax, and abdomen are all brownish-black, the pronotum having a definite median longitudinal impressed line on it. The pattern of the wings is very distinctive, as can be seen from fig. 12. The ground-colour of the forewing is either fuscous or brownish, and is interrupted by three large irregular areas, arranged more or less transversely at wide intervals across the wing, these areas being very pale and subhyaline. There is also sometimes a pale area of irregular shape close to the base. The size and shape of each of the three subhyaline patches varies greatly in different specimens: sometimes they are more or less oval, with fairly regular outline; sometimes more like transverse fasciae, with irregular outline. The typical and most common form has them very much as shown in fig. 12. Legs a bright medium brown. Cerci 3 mm., brownish. Appendages short, dark, slightly upcurved.

♀. Forewing, 11 mm.; hindwing, 9 mm.; expanse, 23 mm.

Closely resembling the male, but larger; forewings more fuscous. (Abdomen shrivelled, so that ventral plate cannot be seen.)

*Types*.—Holotype male (Lake Rotorua, 18th November, 1919; R. J. T.), allotype female (Tokaanu, Lake Taupo, 24th November, 1919, R. J. T.), and series of paratypes in Cawthron Institute collection.

*Locality*.—Appears to be generally distributed throughout New Zealand, but commonest in the North Island.

*Varieties*.—A variety frequently occurs in which the most basal of the three subhyaline patches is either obsolescent or quite absent. In one specimen this and the middle patches have coalesced.

Genus AUCKLANDOBIUS End.

Enderlein, *Deutsche entom. Zeitung*, 1909, pp. 680–82.

Closely allied to *Nesoperla* n. g., but differing from it in having the forewing distinctly shorter than the hindwing, and the cerci longer than the abdomen.

*Genotype*.—*A. complementarius* End.

This genus is remarkable in the shortening of the forewing without any corresponding shortening of the hindwing. There are a number of instances known in the Perlaria in which certain species undergo reduction

of both wings, the hindwings remaining all the time shorter than the forewings, and the venational scheme persisting. It would appear as if the Auckland Islands had been originally colonized by a species of *Nesoperla* long ago, and that the shortening of the forewing and lengthening of the cerci had both been brought about in response to the restricted insular condition.

#### Aucklandobius complementarius End.

Enderlein, *Deutsche entom. Zeitung*, 1909, pp. 681-82, figs. 1, 3.

It is not necessary to add anything to Enderlein's excellent description, with figures of the venation and the ventral plate of the female.

*Types* in Dresden and Stettin Zoological Museums. Collected by Professor H. Krone (two males, one female).

*Locality*.—Auckland Islands.

#### Genus ZELANDOPERLA n. g. (Figs. 13, 15, 16.)

Insects of medium to fairly large size. Radial sector simple in both wings. Costal space with no extra veinlets beyond the humeral. Pterostigma with a complete series of veinlets in both wings. In the forewing the series of cross-veins below  $Cu_1$  is complete distally. Hindwing with the fusion between  $M_{3+4}$  and  $Cu_1$  complete.

*Genotype*.—*Zelandoperla decorata* n. sp.

As already stated under *Nesoperla* (*q.v.*), this genus is very closely allied to *Nesoperla*, but can be at once distinguished from it by the presence of the complete set of pterostigmatic veinlets in both wings, and also by the complete series of distal cross-veins below  $Cu_1$  in the forewing. The pattern of the forewings in all species is much variegated.

#### KEY TO THE SPECIES OF ZELANDOPERLA.

1	{	Distal half of forewing hyaline, with dark-fuscous markings around the cross-veins .. .. .	2
		Distal half of forewing brownish-fuscous, with hyaline patches situated in between the cross-veins .. .. .	<i>Z. fenestrata</i> n. sp.
2	{	Large, robust species, heavily marked with dark fuscous; each distal cross-vein enclosed in a dark almost circular patch .. .. .	<i>Z. decorata</i> n. sp.
		Smaller and slenderer species, less heavily marked with dark fuscous; each distal cross-vein enclosed in a much smaller suboval patch .. .. .	<i>Z. maculata</i> (Hare).

#### *Zelandoperla decorata* n. sp. (Figs. 13, 14a.)

♀. Forewing, 14.5 mm.; hindwing, 12.5 mm.; expanse, 30.5 mm.

*Head* short and wide, dull black, with pale-greyish pubescence. Median ocellus very small, the two lateral ocelli much larger, ruby-red, set on large black tubercles. Eyes, antennae, and mouth-parts dark brown. Behind the ocelli there is a transverse band of dark brown from eye to eye. Antennae 10 mm. long, basal segments very strong and large, second segment much smaller, but considerably larger than the others (fig. 14a).

*Thorax*.—Pronotum 1.5 mm. long by 1.9 mm. wide, with well-defined anterior, posterior, and median longitudinal grooves, the last-named slightly widened in the middle; colour dull black, with greyish-white pubescence (fig. 14a). Meso- and meta-notum shining black, with very slight pubescence. Legs dull brown to blackish, with soft pale hairs; femora mostly brown, with two patches of blackish, one at apex and one a little before; tibia with a black patch at base, followed by a pale-brownish



portion which rapidly darkens distally to chocolate-brown and occupies two-thirds of the length of the whole segment; tarsi deep fuscous.

*Abdomen* shining black, with pale yellowish-brown pubescence and longer, softer hairs of a greyish-white colour on either side of the segments. Ventral plate entire, very slightly convex. Cerci 4 mm. long, downy, deep fuscous, the segments numerous and very short.

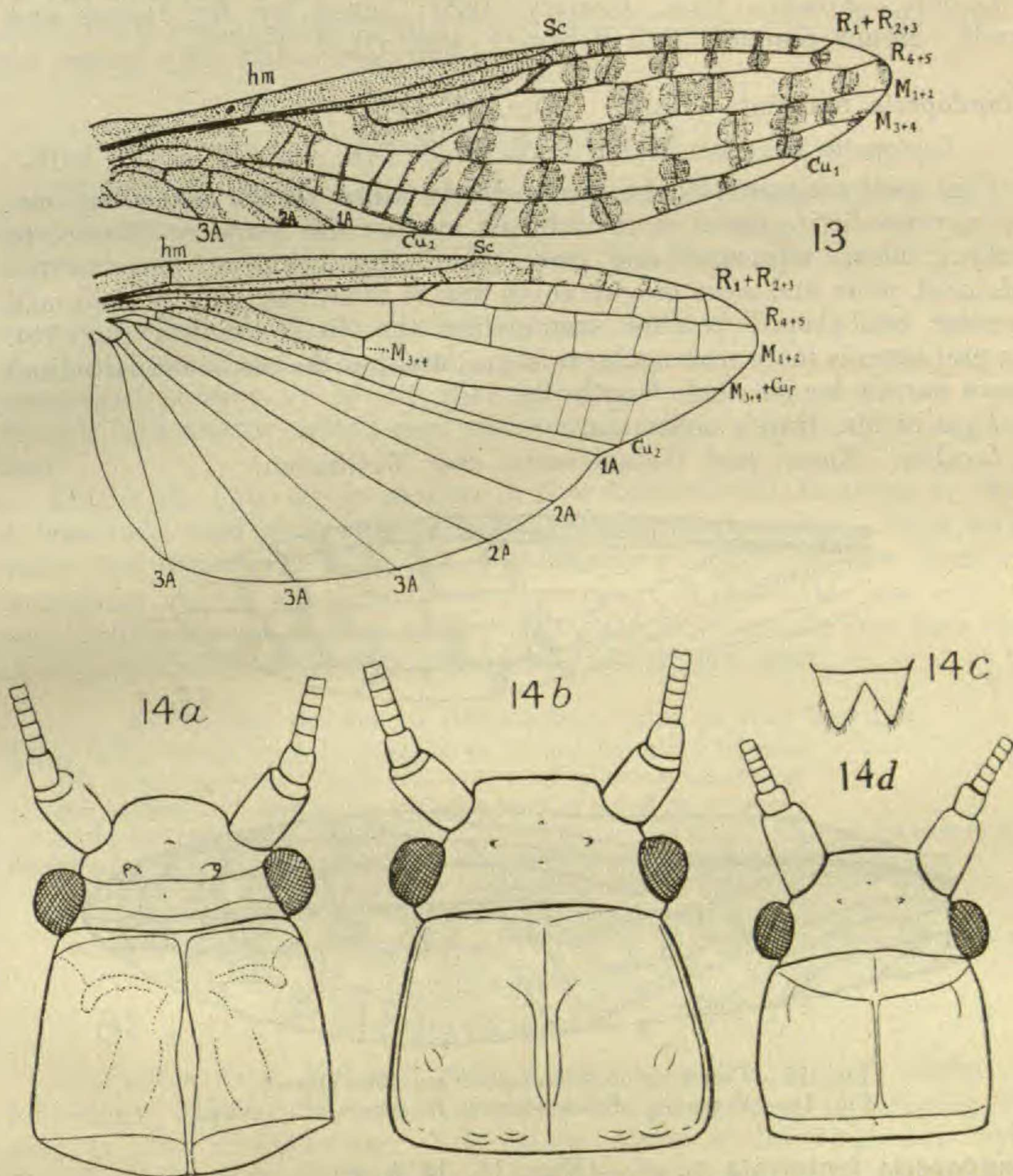


FIG. 13.—Wing-venation and colour-pattern of wings of *Zelandoperla decorata* n. g. et sp. (For lettering see fig. 1.)

FIG. 14.—*a-c*, heads and pronota of species of the genus *Zelandoperla* n. g. ( $\times 16$ ). *a*, *Z. decorata* n. sp., ♀; *b*, *Z. fenestrata* n. sp., ♀; *c*, ventral plate of *Z. fenestrata* n. sp., ♀ ( $\times 16$ ); *d*, *Z. maculata* (Hare), ♂.

*Wings* pale greyish-subhyaline. Forewing richly marked with dark fuscous as follows: the whole of the basal fourth, except a clear patch below *hm* and another between 2A and 3A, and the whole of the costal and subcostal spaces to the end of *Sc*. Medio-cubital and intercubital crossveins outlined with dark fuscous; the whole of the pterostigmatic and distal series enclosed in large fuscous patches, which in the case of the distal series are circular or nearly so in outline. Hindwing marked with

fuscous for basal fourth of costal space and also around pterostigmatic veinlets; the basal third of cubital space also marked in the same way. Venation very dark brown (fig. 13).

*Types*.—Holotype female and three paratype females in Cawthron Institute collection. (Holotype, Arthur's Pass, 16th January, 1920; R. J. T.).

*Locality*.—Arthur's Pass, January, 1920; taken by Mr. Howes and myself. Mount Egmont, 29th February, 1920 (R. J. T.).

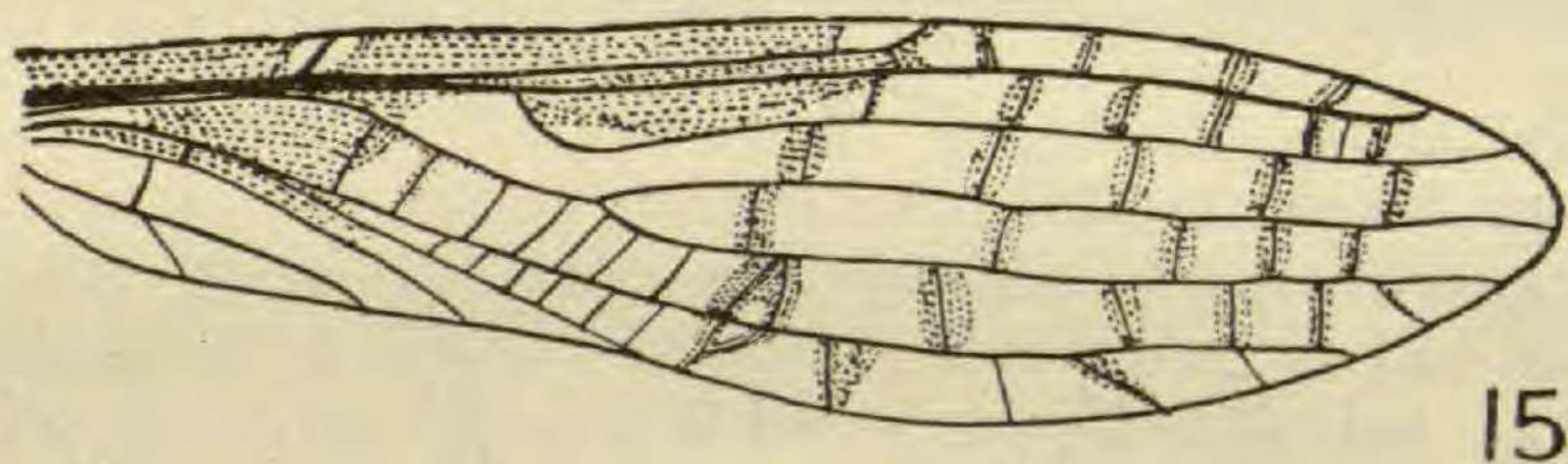
*Zelandoperla maculata* (Hare). (Figs. 15, 14d.)

*Leptoperla maculata* Hare, *Trans. N.Z. Inst.*, vol. 42, p. 29, 1910.

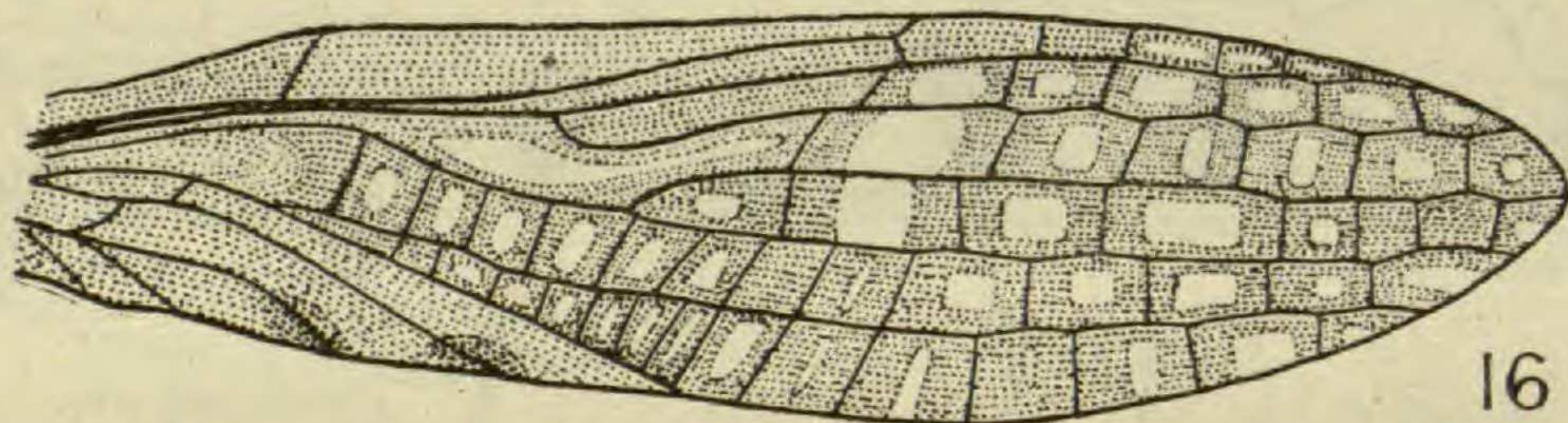
This species appears to be fairly closely allied to the preceding one, but may be distinguished from it by its smaller size (expanse 22 mm. to 27 mm.), longer antennae and cerci (the latter being as long as the abdomen), paler and more greyish coloration of forewings, and by the much narrower oval-shaped patches surrounding the distal veinlets (fig. 15). The pronotum is more rectangular in shape, and has the median longitudinal groove narrow for its whole length (fig. 14d).

*Type* in Mr. Hare's collection.

*Locality*.—Karori and Wainuiomata, near Wellington.



15



16

FIG. 15.—Forewing of *Zelandoperla maculata* (Hare).

FIG. 16.—Forewing of *Zelandoperla fenestrata* n. g. et sp.

*Zelandoperla fenestrata* n. sp. (Figs. 16, 14 b, c.)

♀. Forewing, 13 mm.; hindwing, 11.5 mm.; expanse, 28 mm.

Superficially resembling *Z. decorata* n. sp., but can easily be distinguished from it as follows: Forelegs blackish, tibiae with a band of brown on second quarter; middle and hind legs brown, femora darkened along outer border. Ventral plate deeply divided medially, so as to form two projecting triangular lobes, hairy (fig. 14c). Wings not so darkly shaded as in *Z. decorata*, the ground-colour of the forewing being a medium fuscous brown, on which are numerous subhyaline patches situated in the cellules formed by the cross-veins; these patches are of varying shape, as shown in fig. 16, but mostly more or less rectangular. Hindwing pale semi-transparent grey, tinged with brownish along basal two-thirds of costa and also basally along Cu. In this species also the basal joint of the antenna is

not so much enlarged as in *Z. decorata*, nor is the pronotum so definitely marked with grooves (fig. 14b).

*Types*.—Holotype female and series of paratypes in Cawthron Institute collection. (Holotype, Arthur's Pass, 16th January, 1920; R. J. T.).

*Locality*.—Arthur's Pass, January, 1920; taken by Mr. Howes and myself.

Some of the specimens show a distinct thickening of the pterostigma of the forewing, which tends to become unicolorous reddish-brown; in these cases the pterostigmatic veinlets become weak, and are not easy to see except with transmitted light.

#### Family NEMOURIDAE.

This family, so abundant in the Northern Hemisphere, has not yet been recorded from either New Zealand or Australia. A single genus, *Udamocercia* End., is known from Tierra del Fuego and southern Chile. The family is nevertheless found in both New Zealand and Australia, though individuals of the species are not at all commonly met with, as they are small and insignificant, and seldom fly. The larvae can be recognized at once by having no external gills, and apparently no cerci; though, as a matter of fact, cerci are present, consisting of a single segment only.

This is the only family present in New Zealand and Australia in which a transverse cord or anastomosis is developed on the wings. This transverse cord divides the wing into two nearly equal portions, the distal one containing only a set of main veins running subparallel to one another, and entirely devoid of cross-veins. The anal fan is usually less wide than in Leptoperlidae, and the third branch of 3A is very short.

#### KEY TO THE GENERA OF NEMOURIDAE FOUND IN NEW ZEALAND.

Wings rather broad, Sc not arching so as to meet or nearly to meet the costal margin. Cross-vein <i>m-cu</i> ending above exactly at the median fork, and in line with the basal piece of $M_{1+2}$ above it, in the forewing	.. .. .	<i>Notonemoura</i> n. g.
Wings narrower, Sc arching up so as to meet or nearly meet the costal margin. Cross-vein <i>m-cu</i> in forewing ending above on $M_{3+4}$ at an angle to it; this latter vein much curved as it leaves the transverse cord	.. .. .	<i>Spaniocerca</i> n. g.

#### Genus NOTONEMOURA n. g. (Fig. 17.)

Characters as in the key given above, to which may be added the following: Veinlets  $Sc_2$  and  $R_{1a}$  present in pterostigma of forewing,  $Sc_2$  only in that of hindwing. Intercubital space of forewing very wide;  $Cu_1$  diverging strongly from  $M_{3+4}$  at its apex.

*Genotype*.—*Notonemoura latipennis* n. sp.

#### *Notonemoura latipennis* n. sp. (Fig. 17.)

♂. Forewing, 6 mm.; hindwing, 4.8 mm.; expanse, 13 mm.

*Head* testaceous; eyes, ocelli, and two spots in front of lateral ocelli blackish. Antennae 4 mm. long, dull greyish-brown, with slender whitish annuli at base of each segment.

*Thorax*: Pronotum rectangular, wider than long, testaceous, with a narrow anterior transverse blackish band, a well-marked median longitudinal groove, and on either side a crescentic dark mark and an outer spot, the former merging posteriorly into a broad dark posterior transverse

band. Meso- and meta-notum blackish, touched with brown in front. Legs brownish; hind femora with a testaceous patch on basal half, and hind tibiae slightly darkened distally.

*Abdomen* (shrivelled) blackish, changing to brown apically. An exceedingly long and pointed organ, apparently the copulatory hook, projects upwards from the end of the abdomen.

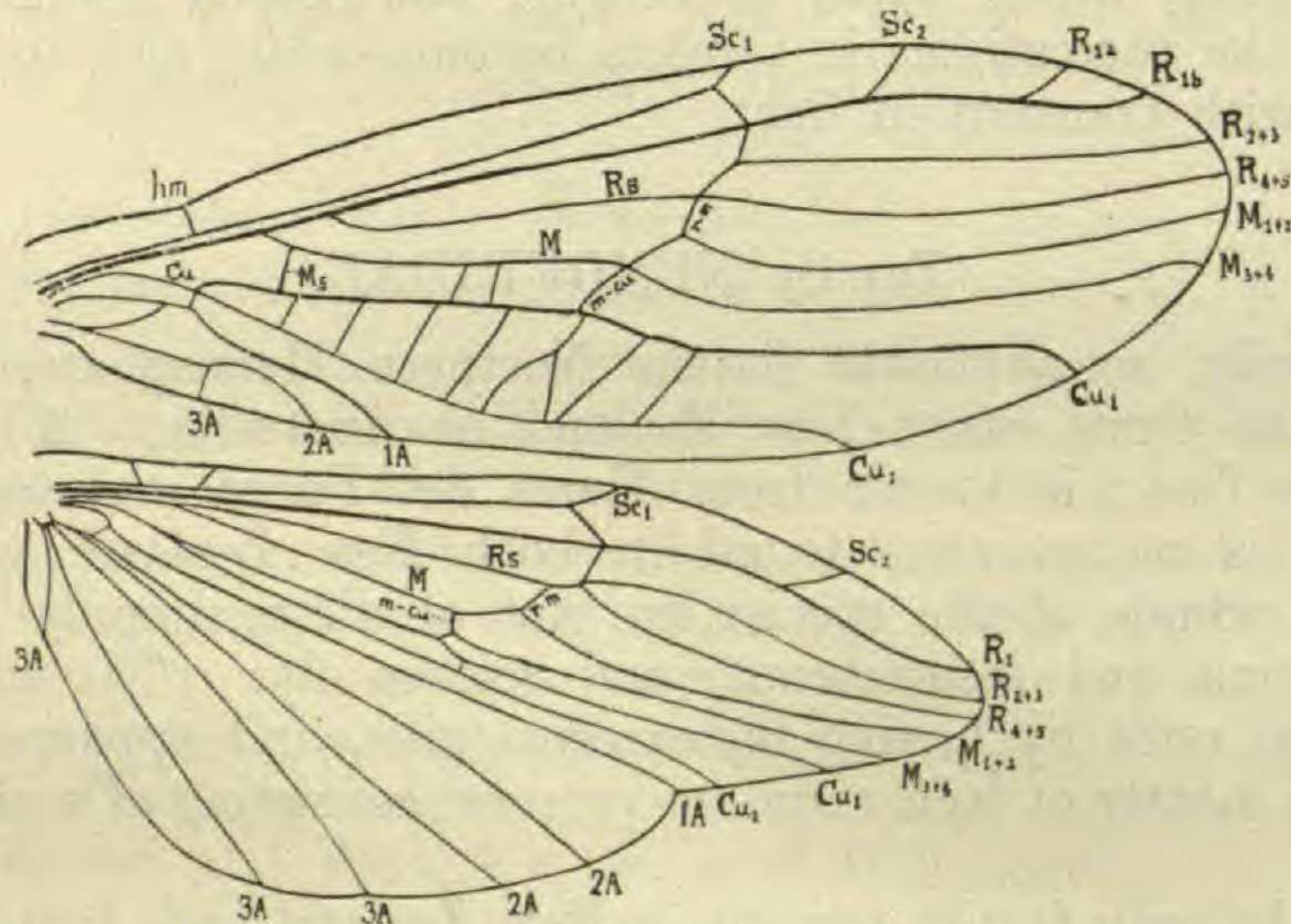


FIG. 17.—Wing-venation of *Notonemoura latipennis* n. g. et sp (For lettering see fig. 1, except *m-cu*, medio-cubital cross-vein, and *r-m*, radio-median cross-vein, forming portions of the transverse cord or anastomosis.)

*Wings* subhyaline, unicolorous; venation very pale testaceous, almost whitish.

*Type*.—Holotype male in Cawthron Institute collection, also a second specimen from Karori, both taken by myself.

*Locality*.—Arthur's Pass, 16th January, 1920 (R. J. T.); Karori, Wellington, 6th December, 1919 (R. J. T.).

#### Genus SPANIOCERCA n. g. (Fig. 18.)

Characters as given in the generic key, to which may be added the following: Pterostigma with only one veinlet,  $Sc_2$ , in both wings. Cross-vein *m-cu* very long in forewing, obliquely placed to rest of transverse cord. Anal fan rather narrow.

*Genotype*.—*Spaniocerca zelandica* n. sp.

#### *Spaniocerca zelandica* n. sp. (Fig. 18.)

♀. Forewing, 9 mm.; hindwing, 7.5 mm.; expanse, 19 mm.

*Head*, including antennae and eyes, dull greyish-black.

*Thorax*: Pronotum subrectangular, slightly wider in front than behind, dull greyish-black. Meso- and meta-notum jet black, the former with a large bright-brown patch posteriorly. Legs dull-brownish, the hind femora with a pale band in middle, the hind tibiae pale basally, darker distally.

*Abdomen* black, tenth tergite testaceous; ventral plate projecting beyond end of abdomen in the form of a narrow subtriangular tongue, pale testaceous in colour.

*Wings*: Forewing subhyaline, slightly infuscated, the veins rich brown and narrowly shaded with fuscous; at about two-thirds of the wing-length there is a faint indication of a pale transverse fascia. Hindwing very pale

fuscous, with brown veins not shaded. Pterostigma in both wings darkened, brownish in colour, except at extreme base for a short distance only, which is paler.

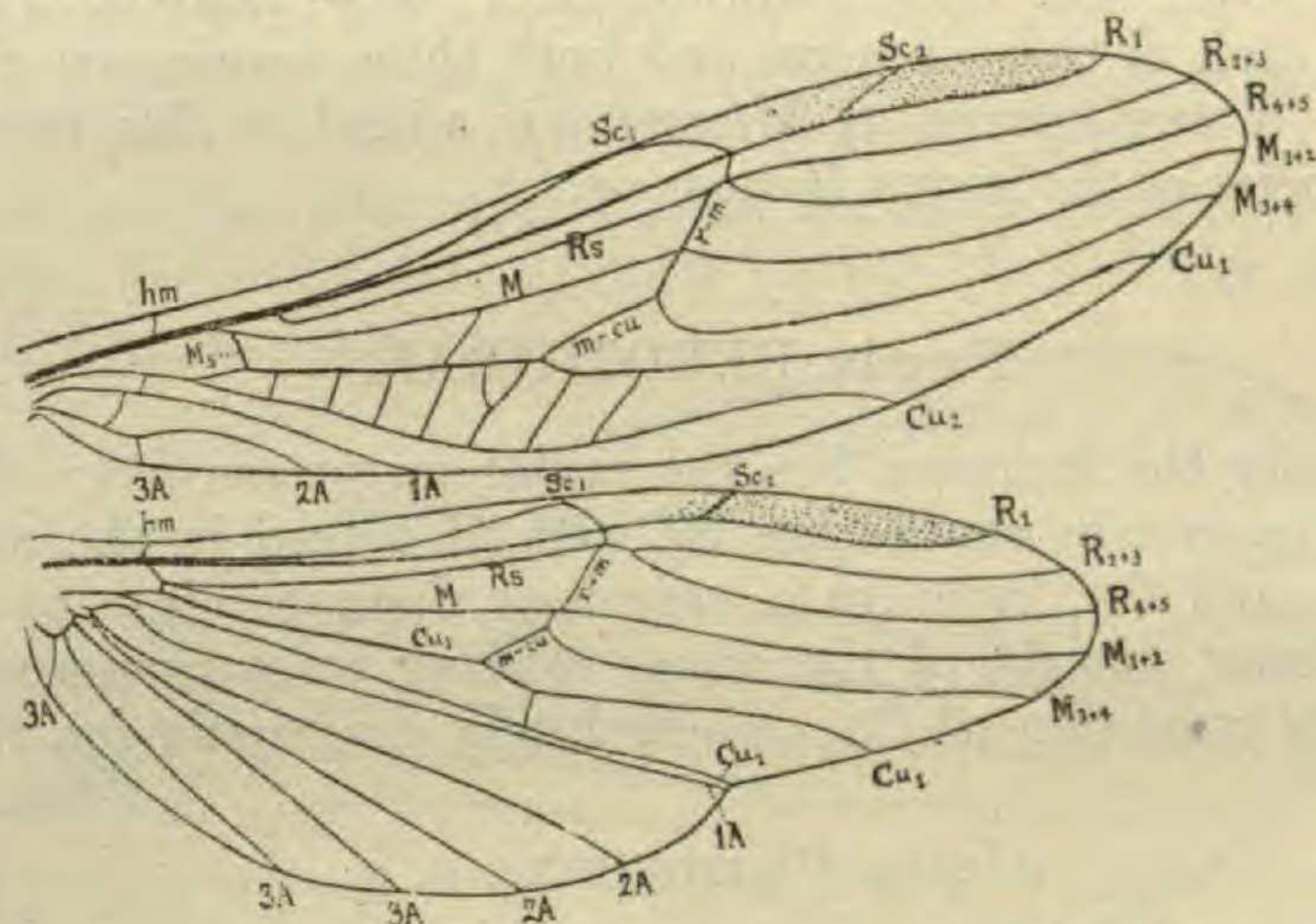


FIG. 18.—Wing-venation of *Spaniocerca zelandica* n. g. et sp.  
(For lettering see figs. 1 and 17.)

*Type.*—Holotype female in Cawthron Institute collection, also series of paratypes.

*Locality.*—Holotype taken at Nelson, 6th January, 1921, by Mr. A. Philpott. I have also taken specimens at Rotorua, Karori, and Dunedin.

There are also several other species of this genus to be found in New Zealand, but the working-out of them will require the collecting of much more material, and therefore they are left for a later paper.

In concluding this paper I desire to thank Mr. G. V. Hudson, F.E.S., F.N.Z.Inst., for giving me the opportunity of examining his type of *Leptoperla grandis*, and for giving me specimens of each of the four species of *Leptoperla* described by Hare.

ART. 19. — *Descriptions of New Species and Varieties of Lacewings (Order Neuroptera Planipennia) from New Zealand, belonging to the Families Berothidae and Hemerobiidae.*

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THE family Berothidae includes only five genera of lacewings, containing species which are very rare and widely scattered about the earth. Three of these genera—viz., *Spermophorella*, *Trichoma*, and *Stenobiella*—are Australian, but no representative of the family has so far been recorded from New Zealand. In this paper the first occurrence of the family for New Zealand is recorded, in the form of a new genus and species.

The family Hemerobiidae is world-wide, consisting of small lacewings whose larvae feed on aphids and psyllids. Two genera have been recorded